## Space Weather Forecast

Issued on Thursday, 08 August 2024 at 01:09 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Moderate to High activity expected.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Moderate with four Moderate flares observed, the largest from the region just west of centre disc. There are ten regions on the visible disc, the largest of which is in the southeast. This has been relatively inactive through this period, only producing common class flares, and has only seen limited development within the proliferation of small spots to its south and west. However this has now also moved into a location where a very mixed polarity spot is evident in a small penumbral area following the main leader spot. Across the south-centre disc two further regions showed ongoing growth in their small spots trailer spots, also including the development of very small mixed polarity regions.

Two potentially Earth directed CMEs (Coronal Mass Ejections) occurred in the past 24 hours in associated with two separate moderate flares. The first produced a complex halo and may have coincided with a far sided event, complicating analysis. Initial ENLIL analysis gives an arrival time late morning on Day 3 (10 Aug) but this is prone to high uncertainty due to interference on coronagraph imagery from the potential aforementioned far sided event. The second is awaiting relevant coronagraph imagery to conduct a detailed analysis, but preliminary estimates indicated a possible arrival later on Day 3 (10 Aug). Confidence in timings for both the CMEs is low until further analysis is conducted

Other CMEs were also evident in imagery. These included one to the northwest, from the eruption of a line of plasma (a filament), in the northwest at around 07/0120 UTC, and a further CME off the southeast disc that had an unknown source location, but perhaps the flaring of the large spot. Another CME was observed from over the northeast limb. These are all likely to miss, however glancing influences are possible from the northwest CME on Day 3 (10 Aug).

**Solar Wind / Geomagnetic Activity:** Slow wind conditions persisted through the period. Solar wind speeds eased from slightly elevated to background, from just over 400 km/s to just below. Interplanetary Magnetic Field was Weak while the north-south component was Weak and variable in direction. Geomagnetic activity remained Quiet to unsettled (Kp 0-3).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) was at background with no solar radiation storms observed.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Moderate to High solar activity is forecast to continue, with occasional Moderate-class flares expected and with a slight chance of isolated Strong-class flares.

**Solar Wind /Geomagnetic Activity:** Two CMEs (Coronal Mass Ejections) have occurred in the past 24 hours which are likely to have an Earth-directed component. The first CME may have coincided with a far sided event, complicating analysis, whilst analysis of the second CME is awaiting relevant coronagraph imagery. Confidence in arrival times of these CMEs is currently very low, but arrivals possible from Day 3 (10 Aug). Additionally a CME which left the Sun on 07 Aug is expected to pass close later on Day 3 (10 Aug), with glancing impacts possible. Background slow winds are expected throughout with just a slight chance of connecting to any

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fast wind from a small coronal hole by the end of the period.

Geomagnetic activity is expected to be mostly Quiet initially, with a chance of isolated Unsettled intervals. However, there is a chance of Active to G1 Minor Storms from Day 3 (10 Aug) due to any CME influence or coronal hole onset, with a slight chance of G2 Moderate storms if these events should co-align.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is expected to persist around background levels, but with a chance of further enhancement given the occurrence of any notable flares. This gives a slight chance of reaching or exceeding the S1 Minor Radiation Storm level.

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 1 | 15 | 50 | 50 |
| Strong | G3 | No | 1 | 1 | 10 | 10 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 80 | 80 | 80 | 80 |
| Very Active | R3 to R5 X | No | 20 | 20 | 20 | 20 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 20 | 20 | 20 | 20 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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